

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ATTY.'S DOCKET: CHAO=11A

In re Application of:)	Art Unit: 1649
)	
CHAO et al.)	Examiner: O. N. Chernyshev
)	
Appln. No.: 10/021,571)	Washington, D.C.
)	
Date Filed: December 19, 2001)	Confirmation No. 9320
)	
For: TRANSMEMBRANE PROTEIN AS A))	
DOWNSTREAM TARGET OF...)	

DECLARATION UNDER 37 CFR §1.132

Honorable Commissioner for Patents
U.S. Patent and Trademark Office
Customer Service Window
Randolph Building, Mail Stop
401 Dulany Street
Alexandria, VA 22314

Sir:

I, Moses V. CHAO, hereby declare and state as follows:

I am the same Moses V. Chao listed as an inventor in the above-identified application and my educational and professional experience is presented in the curriculum vitae attached hereto.

I understand that the ARMS polypeptide of SEQ ID NO:2 or SEQ ID NO:4, as presently claimed, is rejected for lack of a specific and substantial utility because the examiner asserts that any protein which is expressed in

neuronal cells could be used for the same purpose with equal level of success. The examiner's assertion however is not correct. The presently claimed ARMS polypeptide is localized discretely (and specifically) at growth cones and in the synaptic regions of neurons so as to serve as a marker for visualizing the growth cone of neurons (see page 27 of the present specification), which is particularly important when neuroscientists need to determine whether or not neurons are alive and making contacts and synapses, such as after neuronal injury. While there are many cytoskeletal proteins, such as actin and tubulin, which are found in the growth cones, they are not only localized at the growth cones but are also located elsewhere as well. Accordingly, the presently claimed ARMS polypeptide is specific for growth cones and is not a general tissue marker for neurons where any protein expressed in neuronal cells could be used for the same purpose.

After conducting an extensive search of the literature and of commercially available tissue markers/antibodies, I have found only two other proteins, VAMP-2 and GAP-43, besides ARMS, that are growth cone-specific. Antibodies to VAMP-2 and GAP-43 are commercially available from Synaptic Systems and Sigma-Aldrich, respectively.

As very few of the proteins expressed in a neuronal cell are growth cone-specific and as there is a real need for growth cone-specific markers to determine whether or not neurons are alive and making contacts and synapses, the presently claimed ARMS polypeptide of SEQ ID NO:2 or SEQ ID NO:4 does indeed satisfy the utility requirements of 35 U.S.C. §101 by having a specific, substantial and credible utility. Moreover, one of ordinary skill in the art would fully recognize and be enabled for how to use the presently claimed ARMS polypeptide.

The undersigned declares further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

July 2, 2008



/Moses V. Chao/

Date

Curriculum Vitae

Moses V. Chao

Address

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Education

B.A.	1970-1973	Pomona College, Claremont, California
Ph.D.	1975-1980	UCLA, Department of Chemistry, Los Angeles, CA Advisors: Jay Gralla and Harold Martinson
Postdoctoral fellow	1980-1983	Columbia University College of Physicians & Surgeons, Advisor: Richard Axel

Experience

1975-1978	Teaching Assistant, Department of Chemistry, UCLA
1976-1980	Predoctoral research, UCLA, Los Angeles, California
1980-1983	Postdoctoral research, Columbia University, New York, New York
1984-1989	Assistant Professor, Dept. of Cell Biology and Anatomy, Cornell University Medical College, New York
1989-1991	Associate Professor, Cornell University Medical College
1991-1998	Professor of Cell Biology in Medicine, Cornell Medical College
1997-1998	Joseph C. Hinsey Professor of Cell Biology, Cornell Medical College
1998 -	Professor of Cell Biology, Physiology and Neuroscience, Co-Coordinator, Molecular Neurobiology Program, Skirball Institute of Biomolecular Medicine, New York University School of Medicine

Honors

American Cancer Society Postdoctoral Fellowship, 1980-1983
Cornell University Scholars Award, 1985-1988
Hirsch/Caulier Faculty Award, 1987-1992
Zenith Award, Alzheimer's Association, 1991-1994
Presidential Symposium Speaker, Society of Neuroscience Annual Meeting, 1993
Guggenheim Fellowship, 1994
John Flynn Lecturer, Yale University, 1995
Randall Lecturer in Pharmacology, University of Pennsylvania, 1995
Javits Neuroscience Investigator Award, 1996-2003
UCLA Tenth Annual Neuroscience Distinguished Speaker, 1998
Great Lakes Glia Meeting, Keynote Speaker, 1999
Helen Wilshire Walsh Lecturer, 2000
Grass Foundation Lecturer, 2000
Berlin Neuroscience Forum Lecturer, 2002
Weizmann Institute Life Science Lecturer, 2003
Cajal Institute Lecturer, 2004
World Congress on Psychiatric Genetics Plenary Speaker, 2007

Fellow, AAAS

Professional Duties

Editorial Board

1991- 1996	<i>Neuron</i>
1991 -	<i>Journal of Cellular Biochemistry</i>
1992 - 1997	<i>Journal of Biological Chemistry</i>
1993 -	<i>International Journal of Developmental Neuroscience</i>
1994 - 2006	<i>Molecular and Cellular Neuroscience</i>
1995 -	<i>Cytokine and Growth Factor Research</i>
1995 -	Editor, <i>Journal of Neurobiology</i>
1996 - 2002	Section Editor, <i>Journal of Neuroscience</i>
2002 - 2006	Associate Editor, <i>Experimental Neurology</i>
2002 - 2006	Associate Editor, <i>Molecular and Cellular Neuroscience</i>
2006 -	Senior Editor, <i>Journal of Neuroscience</i>

Advisory Panels & Study Sections

1988 - 1993	American Cancer Society Personnel Study Section
1988 - 1993	Regeneron Scientific Advisory Board
1989 - 1996	Alzheimer's Association Medical and Scientific Advisory Board
1992 - 1996	NIH Neuroscience Training (NST) Study Section
1991 - 1999	American Paralysis Association Scientific Advisory Board
1994 - 1996	Trophix Scientific Advisory Board
1996 - 1998	NICHD Intramural Review Panel
1997	NLS-3 Special Emphasis Panel
1997	NIH Neuroscience Working Group
1998	Diabetic Neuropathy Study Section
1998	NSF Developmental Neuroscience Study Section
1999 -	Christopher Reeve Paralysis Foundation Scientific Advisory Board
2000 -	NICHD Board of Scientific Counselors
2000 - 2003	Program Committee, Society of Neuroscience (Chair, 2002)
2001 - 2004	Kirsch Foundation Scientific Advisory Board
2001	NICHD Laboratory of Mammalian Genes and Development Review Panel
2001 - 2005	Chair, New York State Spinal Cord Injury Research Board (SCIRB)
2002	NIA Special Emphasis Panel
2002	NINDS Board of Scientific Counselors Intramural Review Panel
2002	Center for Scientific Review Special Emphasis Panel ZRG FO3A
2003	Wadsworth Foundation Strategic Scientific Advisory Board
2003 - 2006	National Multiple Sclerosis Society Study Section
2004 -	NIH MCDN-2 (NDBG) Study Section Member
2004 -	Chair, Glaucoma Foundation Scientific Advisory Board
2005 - 2006	Chair, NICHD Board of Scientific Counselors
2005 -	Chair, Christopher and Dana Reeve Foundation Scientific Advisory Board
2005 -	Scientific Advisory Board, MIND Center, University of Aarhus, Denmark
2006 -	NIH Neuroscience Blueprint Committee
2006 -	Secretary, Society of Neuroscience
2007 -	NIMH Genes, Cognition and Psychosis (GCAP) Scientific Advisory Board
2007 -	Simons Foundation Scientific Advisory Panel
2007	Hi Q Foundation Workshop on BDNF and Huntington's Disease
2007	Christopher and Dana Reeve Foundation Workshop on Stem Cells

Meeting Organizer

Keystone UCLA Symposium, *Molecular Biology of Neuronal Signal Transduction*
Co-Organizer with Tom Curran, Jim Morgan, and Tom Schwarz
Taos, New Mexico, April 1993
International Society of Neurochemistry, Symposium Chairman, *Neurotrophins*,
Montpellier, France, August, 1993
International Society of Neurochemistry, Program Committee, Kyoto, 1995.
Gordon Conference, *Neurotrophins*, Vice-Chair, Plymouth, New Hampshire, 1993.
Gordon Conference, *Neurotrophins*, Co-Chair, 1995
Society of Neuroscience Symposium Chair, *Molecular Mechanisms of Cell Death*, Miami, 1999
Chair, Society of Neuroscience Program Committee, 2002
Novartis Foundation, *Growth Factors and Psychiatric Disorders*, Chair, London, 2007
New York State Spinal Cord Research Board Symposium, New York Academy of Sciences,
New York, 2008
NGF2008 Katzir Conference on Life and Death in the Nervous System, Galilee, Israel,
September, 2008

Teaching Responsibilities

Molecular Genetics graduate course, Cornell University Graduate School, 1984-1996
Microscopic Anatomy, Cornell University Medical College, 1985-1997
Course Director, 1989-1991
Advanced Cell Biology, Cornell University Graduate School, 1992-1994
MD/PhD Frontiers Course, Tri-Institutional Cornell/Rockefeller/Sloan Kettering MD/PhD
Program, 1991-1996
Short Course in Molecular Biology, Society for Neuroscience Annual Meeting, 1991
Molecular Neurobiology Course, University of Buenos Aires, 1998
Integrative, Developmental and Cognitive Neuroscience Course, NYU Sackler Institute, 1998-
2005
Developmental Neurobiology, NYU Center for Neuroscience, 2002-2005
Cell Biology, NYU School of Medicine, 2001-2005
Synaptic Transmission, NYU Neuroscience Graduate course, 2003
Molecular Oncology, NYU Graduate course, 2005-6
Cellular Neuroscience, NYU Graduate course, 2007
Cold Spring Harbor Laboratory, *Molecular Cloning of Neural Genes*, Instructor, 1990-1995
Cold Spring Harbor Summer Courses
Invited Lecturer in *Advanced Cloning*, 1988
Invited Lecturer, *Molecular Probes*, 1989
Invited Lecturer, *Neuronal Development*, 1993
Invited Lecturer, *Neurodegenerative Disease*, 1997
Woods Hole Marine Laboratory, *Neuroimmunology*, Lecturer, 2001, 2003, 2005, 2007

Ad Hoc Reviewer

Welcome Trust Foundation; Israel Science Foundation; Alberta Heritage Foundation
National Science Foundation; Human Frontier Science Program; Hong Kong Research Grants
Council; Department of Veteran's Affairs; Medical Research Council

Nature, Science, Proceedings of the National Academy of Sciences, Cell, Journal of Neuroscience, Journal of Cell Biology, Journal of Neurobiology, Journal of Clinical Investigation, Journal of Biological Chemistry, EMBO Journal, Development, Neuron

Previous Trainees

Name

Amrita Sehgal, PhD
C. Randy Buck, PhD
Barbara Hempstead, MD/PhD
Nila Patil, PhD
Enrique Escandon, PhD
Kathy Hsu, MD/PhD
Hai Yan, PhD
David Battleman, MD
Marta Benedetti, PhD
Prakash Rao, PhD
Curt Horvath, PhD
Margaret Berg, PhD
Julie Huber, PhD
Margret Einarson, PhD
Mona Friedin, PhD
Alex Castellino, PhD
Sung Ok Yoon, PhD
Bruce Carter, PhD
Alexandra Chittka, PhD
Jason Orlinick, MD/PhD
Donna Osterhout, PhD
Gus Khurigara, PhD
Patrizia Casaccia-Bonnel, MD/PhD
Ravi Tikoo, MD
Francis S. Lee, MD/PhD
Albert Kim, MD/PhD
Mi-Sook Chang, PhD
JoAnn Gensert, PhD
Simon Murray, PhD
Gregg Caporaso, MD/PhD
Hioko Yano, PhD
Daniela Pereira, PhD
Yuriko Iwakura, PhD
Katerina Akassoglou, PhD
Niccolo Zampieri, PhD
Chenghua Gu, PhD
Juan Carlos Arevalo, PhD
Marco Domeniconi, PhD

Current Position

Professor, HHMI, University of Pennsylvania
Research Associate, Emory University
Professor, Weill Medical College, Cornell University
Scientist, Perlegen
Scientist, Genentech
Fellow, Sloan Kettering Institute
Scientist, Amgen
Resident, New York Hospital
Research Programs, Simons Foundation
Postdoctoral fellow, M.I.T.
Associate Professor, Northwestern University
Postdoctoral fellow, University of Illinois
Scientist, Elixir Pharmaceuticals, Cambridge MA
Postdoctoral fellow, Fox Chase Cancer Institute
Research Associate, Albert Einstein College of Medicine
Medical publishing
Associate Professor, Ohio State University
Associate Professor, Vanderbilt University
Research Fellow, University College London
Fellow, Brigham & Women's Hospital
Assistant Professor, SUNY Upstate Medical University
Biotechnology analyst
Associate Professor, Robert Wood Johnson Medical School
Assistant Professor, NYU School of Medicine
Assistant Professor, Weill Medical College, Cornell University
Fellow, Brigham & Women's Hospital
Assistant Professor, Seoul National University
Research Associate, Burke Rehabilitation Center
Senior Research Officer, University of Melbourne
Assistant Professor, Weill Medical College, Cornell University
Research Associate, Brigham and Women's Hospital
Research Associate, Columbia University
Research Associate, Niigata University
Assistant Professor, UCSD
Postdoctoral Fellow, Columbia University
Assistant Professor, Harvard Medical School
Assistant Professor, University of Salamanca
Research Assistant Professor, Hunter College

Current Lab Personnel

Vladimir Camarena, graduate student
Katrín Deinhardt, PhD
Freddy Jeanneteau, PhD
Rithwick Rajagopal, MD/PhD student
Pamela Rochm, MD/PhD

Stephen Russell, MD
Jhon Sutachan-Rubio, graduate student
Synphen Wu, MD/PhD student
Ipe Ninan, PhD

Major Speaker Invitations (Since 1998)

5th International NGF Meeting, Stockholm 1998
Gordon Conference, *Polypeptide Growth Factors*, 1998
Joint Meeting--Japan Neuroscience Society and Japanese Society for Neurochemistry, Tokyo, 1998
COE Symposium on Plasticity and Regeneration, Tokyo, 1998
UCLA Tenth Annual Neuroscience Poster Session Distinguished Speaker, 1998
Columbia University Center for Neurobiology & Behavior, 1999
National Multiple Sclerosis Society, *Neurotrophins and Multiple Sclerosis*, New York City, 1999
International Society of Psychoneuroendocrinology, Orlando, 1999
Symposium on *Apoptosis in neuronal systems*, Regensburg, 1999
12th Camerino-Noordwijkerhout Symposium, Camerino, Italy, 1999
Great Lakes Glia Meeting Keynote Speaker, 1999
New York Academy of Sciences Neuroscience Section Speaker, 1999
SmithKline Beecham Neuroscience Seminar Speaker, 1999
Ohio State University Grass Traveling Scientist, 2000
Miami Project to Cure Paralysis Visiting Professor Lecture, 2000
13th Biennial ISDN Meeting, Heidelberg, Germany, 2000
University of Ottawa Neuroscience Research Institute, 2000
6th International Conference on *NGF and Related Molecules*, Montreal, 2000
Vanderbilt University School of Medicine, 2000
Children's Hospital, Harvard Medical School, 2000
Elan Pharmaceuticals, 2001
University of Tennessee College of Medicine, 2001
University of Oregon Health Sciences Center, 2001
Columbia University College of Physicians and Surgeons, 2001
Beth Israel Hospital, Harvard Medical School, 2001
Research to Prevent Blindness: *Glaucoma: A novel neuronal degeneration*, Sarasota, 2001
University of Rochester School of Medicine, 2002
Johns Hopkins University School of Medicine, 2002
Australian Neuroscience Meeting, Sydney, 2002
University of Massachusetts School of Medicine, 2002
American Society of Neurochemistry, Palm Beach, Florida, 2002
International Workshop, *Repair of the Central Nervous System*, Nice, 2002
7th International Conference on *NGF and related Molecules*, Modena, 2002
Gordon Conference, *Molecular and Cellular Neurobiology*, Hong Kong, 2002
University of Maryland School of Medicine, 2002
University of Coimbra Center for Neuroscience, Portugal, 2003
UK Glial Cell Club, London, 2003
Pasteur Institute, January 2003
University of Iowa School of Medicine, March 2003
University of Alabama School of Medicine, September 2003
Weizmann Institute, Rehovot, 2003
Hebrew University, Jerusalem, 2003
Tel Aviv University, Tel Aviv, 2003
University of Pittsburgh School of Medicine, January 2004
State University of New York, Stony Brook, 2004
Cancer UK, London, 2004

NINDS Seminar Speaker, March 2004
 University of North Carolina School of Medicine, 2004
 Juan March Symposium, Madrid, April 2004
 Buck Institute for Aging Research, 2004
 Institute for the Study of Aging Workshop, New York, 2004
Mechanisms of Protein Activation, Wurzburg, 2004
 Wyeth Research, *Restoring Function to the Damaged Brain*, Perugia, 2004
Neuroplasticity, Neurotrophic Factors and Affective Disorders, Pisa, 2005
 Mt Sinai Hospital, Toronto, June 2005
 Gordon Conference, Neurotrophins, Newport RI, 2005
International Symposium on Aging and Neurodegeneration, Seoul, 2005
 Tong Joh Honorary Symposium, Burke Medical Institute, November, 2005
 Novartis Foundation, *Purinergic Signalling in Neuron-Glia Interactions*, London, 2005
 King's College, London, January 2006
 Columbia University Center for Neurobiology, January 2006
 Cleveland Clinic, February 2006
 University of Louisville, 2006
 Johns Hopkins School of Medicine, March 2006
 University of Louisville School of Medicine, March 2006
 UCSD School of Medicine, March 2006
 Rockefeller University Seminars in Clinical Research, April 2006
Neurotrophins: Mechanisms in Disease and Therapy, Bristol UK, April, 2006
 NGF 2006 Meeting, Lyon, France, May, 2006
Molecular and Cellular Basis of Neuroconnectivity, Leuven, Belgium, May, 2006
 Mt. Sinai School of Medicine, June 2006
 Society of Neuroscience Symposium on Stem Cells, October 2006
 Adler Foundation *Symposium on Alzheimer's Disease*, Salk Institute, February, 2007
 Emory University School of Medicine, May 2007
 USC School of Medicine, September 2007
 World Congress on Psychiatric Genetics, Plenary Speaker, New York City, October 2007
 Columbia University Motor Neuron Center, January 2008
 Keynote Speaker, Dartmouth University Annual Neuroscience Day, February 2008
 Invited Lecturer, Pasteur Institut, April 2008
 Duke University School of Medicine, May 2008

Membership

Society of Neuroscience
 American Society of Cell Biology
 Harvey Society

Patents

US Patent No. 7,169,568 on January 30, 2007

Method for screening molecules that exert a neurotrophic effect through activation of neurotrophin receptors

Bibliography

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- Chao, M.V., Mellon, P., Charney, P., Maniatis, T. and Axel, R. (1983) Introduction and expression of beta-globin genes in murine erythroleukemic cells. *Gene Amplification Anal.* 3, 215-231.
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- Chao, M.V., Mellon, P., Wold, B., Maniatis, T. and Axel, R. (1984) Regulation of globin genes introduced into murine erythroleukemia cells. In: Cell Fusion: Gene Transfer and Transformation, volume 14 (R. Beers and W. Bassett, Editors) Raven Press, New York, pp. 89-100.
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Gene transfer and molecular cloning of the human NGF receptor. *Science* **232**, 518-521.

Johnson, D., Lanahan, A., Buck, C.R., Sehgal, A., Morgan, C., Mercer, E., Bothwell, M. and Chao, M. (1986) Expression and structure of the human NGF receptor. *Cell* **47**, 545-554.

Huebner, K., Isobe, M., Chao, M., Bothwell, M., Ross, A.H., Finan, J., Hoxie, J.A., Sehgal, A., Buck, C.R., Lanahan, A., Nowell, P.C., Koprowski, H. and Croce, C.M. (1986) The nerve growth factor receptor gene is at human chromosome region 17q12-17q22, distal to the chromosome 17 breakpoint in acute leukemias. *Proc Natl Acad Sci USA* **83**, 1403-1407.

Breakefield, X.O., Ozelius, L., Bothwell, M.A., Chao, M.V., Axelrod, F., Kramer, P. L., Lanahan, A., Johnson, D.E., Ross, A.H. and Gusella, J.F. (1986) DNA polymorphisms for the nerve growth factor receptor gene exclude its role in familial dysautonomia. *Molecular Biol. and Medicine* **3**, 483-494.

Chao, M.V. (1986) Expression of transfected genes. In: Gene Transfer (R. Kucherlapati, editor) Plenum Press, New York, pp. 223-241.

Buck, C.R., Martinez, H., Black, I.B. and Chao, M.V. (1987) Developmentally regulated expression of the NGF receptor gene in the periphery and brain. *Proc. Natl. Acad. Sci. USA* **84**, 3060-3063.

Ross, A.H., Meryn, M., Maul, G.G., Koprowski, H., Bothwell, M., Chao, M., Pleasure, D. and Sonnenfeld, K.H. (1986) The nerve growth factor receptor in normal and transformed neural crest cells. In: Neurofibromatosis, Ann. New York Academy of Sciences, pp. 115-123.

Seizinger, B., Rouleau, G.A., Ozelius, L.J., Lane, A.H., Farnyiarz, A.G., Chao, M.V., Huson, S., Korf, B.R., Parry, D.M., Pericak-Vance, M.A., Collins, F.S., Hobbs, W.J., Falcone, B.G., Iannazzi, J.A., Roy, J.C., St. George-Hyslop, P.H., Tanzi, R.E., Bothwell, M.A., Upadhyaya, M., Harper, P., Goldstein, A.E., Hoover, D.L., Bader, J.L., Spence, M.A., Mulvihill, J.J., Aylsworth, A.S., Vance, A.S., Rossenwasser, G.O.D., Gaskell, P.C., Roses, A.D., Martuza, R.L., Breakefield, X.O. and Gusella, J.F. (1987) Genetic linkage of von Recklinghausen neurofibromatosis to the nerve growth factor receptor gene. *Cell* **49**, 589-594.

Littman, D.R. and Chao, M.V. (1987) Use of gene transfer in the isolation of cell surface receptor genes. In: Genetic Engineering, volume 9 (Jane Setlow, Editor), pp. 89-105.

Lemke, G. and Chao, M. (1988) Axons regulate Schwann cell expression of major myelin and NGF receptor genes. *Development* **102**, 499-504.

Hotta, H., Ross, A.H., Heubner, K., Isobe, M., Chao, M.V., Ricciardi, R.P., Tsujimoto, Y., Croce, C.M. and Koprowski, H. (1988) Molecular cloning and characterization of a melanoma-associated antigen (ME491) expressed at the early stages of tumor progression. *Cancer Res* **48**, 2955-2962.

Chao, M.V. (1988) Gene transfer and expression of mammalian cell receptors. In: Endocrine Genes: Analytical methods, experimental approaches, and selected systems (Y-F. Lau, Editor) Oxford University Press, New York, pp. 3-18.

Sehgal, A., Patil, N. and Chao, M. (1988) A constitutive promoter directs expression of the nerve growth factor receptor gene. *Mol Cell Biol* **8**, 3160-3167.

Peacocke, M., Yaar, M., Mansour, C.P., Chao, M.V. and Gilchrist, B.A. (1988) Induction of nerve growth factor receptors on cultured human melanocytes. *Proc Natl. Acad. Sci. USA* **85**, 5282-5286.

Sehgal, A., Wall, D. and Chao, M. (1988) Efficient processing and expression of human NGF receptors in

- Xenopus* oocytes: Effects on maturation. *Mol. Cell Biol* **8**, 2242-2246.
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